To: Ali Zaidi
From: Jim Stock
RE: Gasoline price effects of additional E15 sales
Date: March 19, 2022

Because the 1-pound RVP waiver applies to E10, but not to E15, summer sales of E15 are not possible in many parts of the country. This poses an impediment to broader acceptance of E15. E15 is typically priced at a discount to E10, so increasing E15 sales (with a commensurate decline in E10 sales) would decrease national average prices. Extending the 1-pound waiver to E15 might plausibly increase E15 sales by 150-400 mgal during 2022. If extending the RVP waiver to E15 does not affect (a) the current percentage spread between E15 and E10 prices and (b) total vehicle miles traveled, then then this increase in E15 sales would reduce national average gasoline prices by $0.001 to $0.003 per gallon (0.1 to 0.3 cents per gallon).

Discussion

1. The time frame for all values here is through the end of 2022.

2. In 2021, we estimate that approximately 400 million gallons (mgal) of ethanol was sold in E15, corresponding to approximately 2.7 billion gallons (Bgal) of blended E15 sales.[1] The low end of the projected E15 increase, 150 mgal, corresponds to an increase roughly proportional to the summer months (June 1 – Sept. 15). The high end of the projected E15 increase corresponds to a doubling of E15 sales.
    a. According to the Alternative Fuel Data Center, there are 2300 E15-capable gasoline stations, approximately 2% of all stations nationally.
    b. If the RVP waiver extension were temporary, it is hard to see how any stations would be induced to install additional blending infrastructure, so that the pumping capacity for E15 would be limited to existing facilities. Any additional pumps that were installed would require time to come online.

3. RFA estimates that the average discount on E15, relative to E10, is 3.6%. This discount is consistent with fundamentals. The cost basis for the E15-E10 differential is (a) different costs for the fuel content (wholesale petroleum gasoline, wholesale ethanol) and (b) different RIN values. The retail operator can be treated as purchasing wholesale petroleum gasoline and wholesale ethanol and blending them. The RIN obligation on the wholesale petroleum is borne by the refiner so the retailer/blender incurs no further RIN obligation (it is built into the wholesale E0 price). When the retailer/blender blends the ethanol into the retail fuel, the the RIN is detached and the retailer/blender can sell the RIN and passes the value through to the consumer. Thus, the cost basis for E10 is .1×Wholesale price of E100 (with RIN attached) + .9×Wholesale price of E0 - .1*Price of D6 RIN (which is sold upon blending). At current wholesale prices and D6 RIN prices, this amounts to a $0.09/gallon discount, or approximately 2.5%. This 2.5% discount is similar to the RFA discount of 3.6%. We use the RFA discount of 3.6%, however if the discount were larger (smaller) then the effects on national average prices would be greater (less) than indicated here.

4. E15 has 98.3% the energy content of E10. Under the plausible assumption that VMT remain constant, for each gallon of increased E15 sales, E10 sales fall by 0.983 gallons so that total energy (and thus total VMT) remain constant. Because of this reduced efficiency, if the E15

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[1] Data source: ethanol and motor gasoline consumption for calendar year 2022, EIA STEO data browser (accessed March 19, 2022), Table 4a, assuming no sales of E0 for on-road purposes.

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discount is 1.7%, relative to E10, then national average pump prices fall as E15 sales increase, but total consumer spending on gasoline remains constant. For discounts less than 1.7%, consumer spending actually increases (although average pump prices decline, as long as there is a positive discount). Using the high estimate of E15 sales increase,400 mgal, and the RFA 3.6% discount, total spending on gasoline falls by $215 million, or slightly less than $2/household, over calendar year 2022 (the per-gallon average price decline of 0.3 cents is partially countered by needing to buy slightly more total gallons to allow vehicle miles traveled to stay the same).

5. The price calculations here are for the "main effect" or "composition effect", which is shifting the composition of sales while holding E10 and E15 pump prices constant. E10 and E15 prices might change, however, as E15 sales expand, because of an effect of increasing ethanol demand on (a) E100 prices (increasing demand would increase E100 prices) and (b) RIN prices (increasing E100 sales would decrease the price of D6 RINs). It is plausible to think that E10 prices might fall somewhat, and E15 prices might rise, as a result of the increasing sales of ethanol; if so, the decline om national gasoline prices would be less than indicated here.

6. The following table summarizes effects on gasoline prices for various E15 sales expansions and various E15-E10 discounts:

Expansion of ethanol sold in E15 (mgal)	Percentage discount of E15 relative to E10	Effect on national average prices ($/gal)
150	2.5%	-$0.0008
400	2..5%	-$0.0021
150	3.6%	-$0.0011
400	3.6%	-$0.0030
150	5.0%	-$0.0016
400	5.0%	-$0.0042